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(54) **INITIATION SEQUENCES FOR RAMPING-UP PULSE POWER IN A MEDICAL LASER HAVING HIGH-INTENSITY LEADING SUBPULSES**

(57) A gradual ramp-up of output power in a medical laser prevents rapid temperature rise at a fiber tip of a laser handpiece when residual contamination from a prior medical procedure remains on the fiber tip after an extended cooling period. The gradual ramp-up eliminates effects of an acoustic shock wave resulting from the rapid temperature rise to prevent damage to fiber and optical components in the laser device.

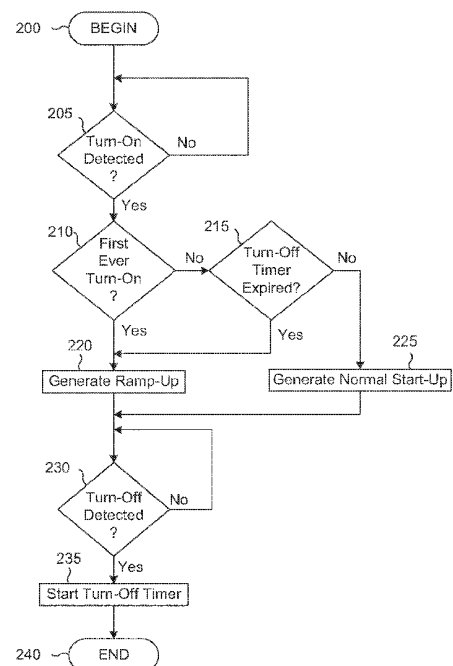


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 2006/142745 A1 (BOUTOUSSOV DMITRI [US]) 29 June 2006 (2006-06-29) * paragraph [0033]; figure 3 *	1-8	INV. A61B18/20 H01S3/10
X	DE 10 2006 037289 A1 (LIMMER LASER GMBH [DE]) 14 February 2008 (2008-02-14) * abstract *	1-6	ADD. A61B17/00
Y	* paragraph [0030] * * figures 3, 4 *	7,8	
X	WO 2010/111604 A1 (AMS RES CORP [US]; KANG HYUN WOOK [US]; NEMEYER RAYMOND ADAM [US]; HOD) 30 September 2010 (2010-09-30) * paragraphs [0052], [0053] * * figure 13 *	1,2,4-6	
X	US 2008/095201 A1 (MU LIYUE [US] ET AL) 24 April 2008 (2008-04-24) * paragraphs [0028] - [0036] * * figures 3-5 *	1,2,4-6	
Y	US 2008/099187 A1 (RINI DANIEL P [US] ET AL) 1 May 2008 (2008-05-01) * paragraph [0008] *	7,8	TECHNICAL FIELDS SEARCHED (IPC) A61B H01S
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 April 2020	Examiner Lohmann, Stefan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-8

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-8

A medical laser that generates a startup sequence of pulses of electromagnetic energy, the startup sequence comprising an initial sequence having at least one pulse, the at least one pulse having a startup power level that is less than a set power level.

2. claims: 9-15

A method of activating a medical laser, comprising detecting a turn-on event and generating a ramp-up or startup sequence and.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006142745 A1	29-06-2006	AU 2005272614 A1	23-02-2006
		CA 2575564 A1	23-02-2006
		EP 1782511 A2	09-05-2007
		EP 2438879 A2	11-04-2012
		EP 2974686 A1	20-01-2016
		ES 2543606 T3	20-08-2015
		JP 5183200 B2	17-04-2013
		JP 2008509755 A	03-04-2008
		JP 2012090993 A	17-05-2012
		US 2006142745 A1	29-06-2006
		WO 2006020946 A2	23-02-2006

DE 102006037289 A1	14-02-2008	NONE	

WO 2010111604 A1	30-09-2010	AU 2010229776 A1	27-10-2011
		CA 2756507 A1	30-09-2010
		EP 2416725 A1	15-02-2012
		EP 3263057 A1	03-01-2018
		JP 5712201 B2	07-05-2015
		JP 2012521808 A	20-09-2012
		US 2012022511 A1	26-01-2012
		US 2015257826 A1	17-09-2015
		US 2016100886 A1	14-04-2016
		US 2016354147 A1	08-12-2016
		US 2019142514 A1	16-05-2019
		WO 2010111604 A1	30-09-2010

US 2008095201 A1	24-04-2008	US 7313155 B1	25-12-2007
		US 2008095201 A1	24-04-2008

US 2008099187 A1	01-05-2008	US 7316262 B1	08-01-2008
		US 2008099187 A1	01-05-2008
		US 2017268829 A1	21-09-2017
